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# Banks' procyclical behavior: Does provisioning matter?

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## Abstract

A panel of 186 European banks is used for the period 1992-2004 to determine if banking behaviors, induced by the capital adequacy constraint and the provisioning system, amplify credit fluctuations. We find that poorly capitalized banks are constrained to expand credit. We also find that loan loss provisions (LLP) made in order to cover expected future loan losses (non discretionary LLP) amplify credit fluctuations. By contrast, LLP used for management objectives (discretionary LLP) do not affect credit fluctuations. The findings of our research are consistent with the call for the implementation of a dynamic provisioning system in Europe.

*JEL classification:* G21

*Keywords:* Bank lending; Loan loss provisions; Capital requirement

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## 1. Introduction

Much concern has been recently expressed about factors explaining fluctuations in bank lending. Central banks, as well as banking regulators, are concerned since such factors could exacerbate the business cycle, cause financial instability and misallocate lending resources. The literature which analyzes fluctuations in bank lending behavior provides some empirical evidence of cyclicity. Asea and Blomberg (1998) show that banks change their lending standards, from tightness to laxity, systematically over the cycle. Lax-lending standards occur during expansions periods and affect aggregate economic activity. In addition, Peek

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et al. (2003) and Lown and Morgan (2006) clearly identify the effects of loan supply shocks on fluctuations in credit and GDP.

Misevaluation of credit risk over the business cycle may explain fluctuations in bank lending. In phases of economic boom, banks are inclined to take on greater risks, owing to their basically positive anticipations as regards the course of the economy and future trends. By contrast, banks are excessively pessimistic during cyclical downturns if they overstate credit risk. Disaster myopia (Guttentag and Herring, 1984), herd behavior (Rajan, 1994) and the institutional memory hypothesis (Berger and Udell, 2003) account for misevaluation of credit risk. Disaster myopia emphasizes that banks tend over time to underestimate the probability of low-frequency shocks while herd behavior focuses on the idea that banks management is obsessed with short-term concerns and perception of reputation. As for the institutional memory hypothesis, it stresses that current loan officers ease credit standards over time. The previous loan bust is not remembered because of loan officer turnover.

The literature which analyzes fluctuations in bank lending also focuses on the impact of monetary policy shocks. A better understanding of the economy's response to a monetary policy shock requires to consider a bank lending channel (Bernanke and Gertler, 1995) which emphasizes the role of imperfections in the market for bank debt. This hypothesis is empirically supported by Kashyap and Stein (1995, 2000) for American banks and by Ehrmann et al. (2003) for European banks. Imperfections in the market for bank capital can also be stressed to explain fluctuations in bank lending. Van den Heuvel (2002) focuses on capital requirements and defines a bank capital channel by which monetary policy can change the supply of bank loans through its impact on bank equity. The effects of capital requirements on bank lending does not only operate through changes in monetary policy. Capital

requirements are also relevant in explaining the impact of macroeconomic conditions and changes in banking regulation on bank lending (Furfine, 2001; Zicchino, 2005).

In this paper, we point out another factor which may amplify the cyclicity of bank lending: the provisioning system. Provisioning rules and capital requirements are linked through the coverage of credit risk: the conceptual framework of credit risk management supposes that expected losses have to be covered by loan loss provisions while unexpected losses have to be covered by bank capital. While regulatory constraint explicitly links the expansion of bank lending with bank capital, such a constraint does not exist on provisioning rules. However, loan loss provisions have a direct impact on banks profit. An underestimated expected credit risk could reinforce banks' incentives to grant new loans since lending costs are understated. In addition, increases in loan loss provisions due to deterioration in loan portfolio quality can lead to a decrease in banks capital if losses are too strong. Credit risk management without provisioning rules covering expected credit risk may therefore have procyclical effects. This concern is all the more important as banking regulators and academic researchers focus mainly on capital requirements and tend to disregard provisioning practices. Hence, in this paper we analyze if the evolution of loan loss provisions may explain changes in banks' lending behavior over the business cycle.

The relationship between loan loss provisions and credit supply fluctuations has to be cautiously analyzed because loan loss provisions merge different information and behaviors.

The literature distinguishes two components<sup>1</sup>. The first one, called the non discretionary

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<sup>1</sup>Accounting practices distinguish specific provisions and general provisions (Cortavaria et al., 2000). Specific provisions are defined by specific accounting rules. They depend on identified credit losses and they will increase specific loan loss reserves which are deducted from assets. General provisions have to cope with latent losses not yet identified and will be added to general loan loss reserves on liabilities, but banks do not implement rigorous and statistical methods to compute them. Consequently, general provisions depend

component, is made in order to cover expected future credit losses in a bank's loan portfolio (Whalen, 1994; Beaver and Engel, 1996). Provisioning practices are said to be backward-looking because banks mainly relate non discretionary provisions to problem loans. During economic upswings, few problem loans are identified and the level of loan loss provisions is low. Conversely, during downturns loan loss provisions increase because loan defaults are usually high. Laeven and Majnoni (2003) and Bikker and Metzmakers (2005) show that the ratio of loan loss provisions to total assets exhibit a strong cyclicalilty. As a result, the non discretionary component is a driving force in the cyclicalilty of loan loss provisions and leads to a misevaluation of expected credit losses. Indeed, the expected credit risk appears as soon as the loan is granted and not only during the downturn when the problem loans are finally identified. A time-lag can notably be stressed between riskier loans which are granted during the peak of the business cycle (Jiménez and Saurina, 2005) and loan loss provisions which are built up only during the next downturn according to backward-looking rules. Expected credit losses are therefore under-provisioned during an upswing phase. Conversely, banks have to charge provisions too late during the downturn. The cyclicalilty of loan loss provisions directly affect bank profits and bank capital (Jordan et al., 2002) which could influence the bank's incentive to grant new loans and increase the cyclicalilty of its lending.

The second component, called the discretionary component, is due to the utilization of loan loss provisions for management objectives. At least three different discretionary actions can be distinguished (Beaver and Engel, 1996; Ahmed et al., 1999). The first one is the income smoothing behavior. Banks have incentives to smooth earnings over time. When earnings are expected to be low, loan loss provisions are deliberately understated

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partially on expansion of total loans and they are manipulated by discretionary behaviors of bank managers.

to mitigate adverse effects of other factors on earnings. On the other hand, when earnings are unusually high, banks choose discretionary income-reducing accruals. Thus, under the income-smoothing behavior, banks choose accruals to minimize the variance of reported earnings. This implies that loan loss provisions increase during an expansionary phase and decrease during a recession phase. The two other discretionary actions are concerned with capital management and signaling. With regard to capital management, capital-constrained banks can use discretionary accruals to achieve regulatory-capital targets. General and specific provisions reduce Tier 1 capital via their effect on earnings and then poorly capitalized banks could be less willing to make loan loss provisions. However, general provisions are also included as components of Tier 2 capital and deduced from risk-weighted assets<sup>2</sup>. An increase in general provisions may actually increase the regulatory capital, especially if the increase in Tier 2 is larger than the decrease in Tier 1 capital. To the extent that such discretionary behavior increases regulatory capital without a corresponding reduction in risk of insolvency, it constitutes a regulatory capital arbitrage. The last discretionary behavior occurs when banks use loan loss provisions to signal their financial strength. The bank manager can signal that the earning power of the bank is strong enough to absorb future potential losses by increasing current loan loss provisions.

Although the recent debate about whether current practices of provisioning are biased towards procyclical bank behavior, there is no study to our knowledge which explicitly examines the impact of loan loss provisions on bank lending. Shrieves and Dahl (2002) - analyzing the utilization of the discretionary accounting practice of the Japanese banks during 1989-1996 - find a negative and significant relationship between loan loss provisions

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<sup>2</sup>General provisions can increase loan loss reserves of up to 1.25% of risk weighted assets.

and year-on-year change in total loans. This result is consistent with the hypothesis that loan loss provisions influence credit cycles. However, to test explicitly the impact of loan loss provisions on the fluctuations of bank lending, the discretionary component and the non discretionary component need to be distinguished. Indeed, the cyclical behavior of non discretionary provisions should reinforce the cyclical nature of bank lending. On the contrary, the discretionary component, through the income smoothing behavior, may reduce the procyclicality of bank lending. Using a panel of European banks for the period 1992-2004, we estimate the non discretionary and discretionary components of loan loss provisions in order to individually isolate their impact on banks lending.

The remainder of the paper is organized as follows. Section 2 reports the empirical methodology employed to differentiate the discretionary and non discretionary components of loan loss provisions. Section 3 presents estimates of the impact of provisioning practices on credit fluctuations. Section 4 discusses the credit cycle and dynamic provisioning practices. Concluding remarks are presented in the final section.

## **2. Estimation of the discretionary and non discretionary components of loan loss provisions**

### *2.1. Data and descriptive statistics*

We use a sample consisting of an unbalanced panel of annual report data from 1992 to 2004 for a set of European commercial and cooperative banks<sup>3</sup> established in 15 Euro-

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<sup>3</sup>We choose a sample of commercial and cooperatives banks to work on an harmonized set of banks. We do not exclude from our sample banks involved in mergers or acquisitions. Nevertheless, few banks present a structural break in the balance sheet: less than 20 banks present a variation of total asset over the period greater than 20% (the sample mean of the variation of total asset is 10.58%).

pean countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. The bank data used for the estimates come from Bankscope Fitch IBCA<sup>4</sup>. A majority of banks do not give information on some variables needed by this study (especially non performing loans and total capital ratio). Also we delete banks with less than five years of time series observations. Moreover, we exclude outliers by eliminating the extreme bank/year observations when a variable present extreme values<sup>5</sup>. The final sample consists of 186 European banks out of the 2 513 available at the beginning. However, our unbalanced sample represents a significant part of total loans available in Bankscope Fitch IBCA. The average cover rates of total loans are around 37% in 1992 and 54% in 2004. Table A1 (see Appendix) shows descriptive statistics

## *2.2. Modelling bank provisions*

To test the impact of loan loss provisions (LLP) on fluctuations in bank lending, we need to estimate the discretionary and the non discretionary components of LLP. We use a methodology similar to the one developed by Ahmed et al. (1999). Factors which may explain the choice of LLP are grouped into three classes.

First, the non discretionary component of LLP reflects expected losses but backward-looking rules based on identified credit losses give a strong cyclicalitity to this component. The model includes three variables which represent the risk of a bank's portfolio. The ratio of non performing loans to gross loans at the end of the year  $t$  ( $NPL_{it}$ ) and the first difference

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<sup>4</sup>All the banks in our sample publish their annual financial statements at the end of the calendar year.

<sup>5</sup>The outliers represent 125 banks of the banks excluded of our sample (5% approximately of the initial sample). Thus most of the banks were deleted because we miss data about some variables.



of  $NPL_{it}$  ( $\Delta_{t+1/t}NPL_{it} = NPL_{it+1} - NPL_{it}$ ) are good indicators of the risk of default on banks' loans. Hence, we expect a positive relationship between these two variables and LLP. We also include the risk of default for the overall credit portfolio, measured by the ratio of loans to total asset ( $L_{it}$ ). The coefficient associated with this variable should also be positive.

Second, the discretionary component of LLP results from three different management objectives. Under the income smoothing hypothesis, banks understate (overstate) LLP when earnings are expected to be low (high) relative to that of other years (inter-temporal smoothing). If banks use LLP to smooth earnings, then we would expect a positive relation between earnings before taxes and loan loss provisions ( $ER_{it}$ ) and LLP. As the propensity to smooth income is higher for banks with good performance relative to banks with moderate current performance, we introduce a dummy variable which takes the value of  $ER_{it}$  for banks with positive earnings before taxes and loan loss provisions and 0 otherwise ( $ER\_H_{it}$ ). We should find a positive coefficient for  $ER\_H_{it}$  if there is non linearity in the relation between LLP and earnings. Poorly capitalized banks can also use LLP to manage regulatory capital. We compute the variable  $TCRL_{it}$  which takes the value of the total capital ratio (TCR) minus 8 and divided by 8 when observations for bank  $i$  are in the first quartile of TCR and 0 otherwise. A positive correlation between LLP and  $TCRL_{it}$  could be expected if poorly capitalized banks are less willing to make LLP (Shrieves and Dahl, 2002). However, accounting relations could also influence the relation between bank capital and loan loss provisions<sup>6</sup>. If regulatory capital variations are more related to retained earnings than loan loss allowances,

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<sup>6</sup>Regulatory capital is composed of Tier 1 - which includes equity and retained earnings - and Tier 2 - which includes subordinated debt and loan loss allowances. LLP are therefore positively correlated to Tier 2 and negatively to Tier 1.

correlation should be negative between LLP and  $TCRL_{it}$ <sup>7</sup>. LLP can finally also be used to signal their financial strength. Beaver et al. (1996) suggest that loan loss provisions can indicate that "management perceives the earnings power of the bank to be sufficiently strong that it can withstand a hit to earnings in the form of additional loan loss provisions". If signaling is an important incentive in choosing LLP, then we should observe a positive relation between LLP and changes in future earnings before taxes and LLP (Whalen, 1994; Ahmed et al., 1999). The variable  $SIGN_{it}$ , defined as the one-year-ahead changes of earnings before taxes and loan loss provisions ( $SIGN_{it} = (ER_{it+1} - ER_{it})/0.5(TA_t + TA_{t+1})$ , where TA is the total asset), is computed to test the signaling hypothesis. A positive correlation with LLP is expected.

Third, the macroeconomic environment should affect the ability of borrowers to repay banks' assets. The private sector wealth will vary with the economic cycle, so we introduce the annual growth rate of GDP,  $\dot{y}_{it}$ . We expected a negative sign for the variable  $\dot{y}_{it}$ <sup>8</sup>.

Equation (1) models the relationship between loan loss provisions and the explanatory variables defined above:

$$\begin{aligned}
 LLP_{it} = & \alpha_0 + \underset{(+)}{\alpha_1} LLP_{it-1} + \underset{(+)}{\alpha_2} NPL_{it} + \underset{(+)}{\alpha_3} \Delta_{t/t+1} NPL_{it} + \underset{(+)}{\alpha_4} L_{it} + \underset{(-)}{\alpha_5} \dot{y}_{it} \quad (1) \\
 & + \underset{(+)}{\alpha_6} ER_{it} + \underset{(+)}{\alpha_7} ER\_H_{it} + \underset{(+/-)}{\alpha_8} TCRL_{it} + \underset{(+)}{\alpha_9} SIGN_{it} + \varepsilon_{it},
 \end{aligned}$$

where  $LLP_{it}$  is the ratio of loan loss provisions (specific provisions plus general provisions) to

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<sup>7</sup>We use in our study the total capital ratio (TCR = TIER1+TIER2) because a majority of banks do not give specific information on their level of TIER 1 and TIER 2.

<sup>8</sup>Some studies have empirically studied the economic cycle as a determinant of loan loss provisions (Fernandez de Lis et al. (2001), Laeven and Majnoni (2003) and Bikker and Metzmakers (2005)). They find a significant and negative impact on provisions: loan losses increase (and hence LLP) when  $\dot{y}_{it}$  decreases.

total assets at the end of the year  $t$  for bank  $i$ . We introduce the lagged dependent variable as explanatory variable to take into account a dynamic adjustment of  $LLP_{it}$ . If banks adjust their provisions slowly to recognize potential losses against loans following a default event, then provisions could be systematically related to each period. The model accounts for the possibility that the use of discretionary LLP for one purpose is conditional on the effects of the other two motivations; this is done by jointly estimating the relationships between loan loss provisions and income smoothing, capital management and signaling behaviors.

Equation (1) is estimated to compute the non discretionary component ( $NDISC_{it}$ ) and the discretionary component ( $DISC_{it}$ ) of LLP. We assume that these two components are linear functions of the variables included in equation (1). Thus, the non discretionary component of LLP is estimated as the sum of the products of its explanatory variable times the corresponding estimated coefficient from equation (1). The same method is used to compute the discretionary component.

### 2.3. Empirical results

As we consider a dynamic adjustment of LLP, equation (1) is estimated with the generalized method of moments (GMM) using first differences (Arellano and Bond, 1991) and orthogonal deviations (Arellano and Bover, 1995). The results are reported in Table 1. This estimation is robust to heteroskedasticity and autocorrelation. We also ensure that the correlations between exogenous variables are weak.

The coefficients on  $NPL_{it}$  ( $\alpha_2$ ) and on  $\Delta_{t/t+1}NPL_{it}$  ( $\alpha_3$ ) are significantly positive at the 1% level. This result implies that the cyclical evolution of non performing loans influences provisioning via the backward-looking rules. Bank profits are therefore also influenced by the

cyclicality of identified credit losses via loan loss provisions. The other variable introduced to assess the effect of expected credit losses on LLP choices, the ratio of loans to total asset  $L_{it}$ , is not significant at the 10% level. The significant and negative coefficient for GDP growth ( $\alpha_5$ ) indicates that the macroeconomic situation is relevant, which strengthens the cyclical behavior of LLP. Business cycle influences financial strength of firms and households and therefore is closely related to problem loans. This implies not only an increase in specific provisions according to backward-looking rules but also an increase in the general provisions as the GDP growth modifies the credit exposure of banks. The lagged dependent variable is also significant at the 1% level, which suggests that banks adjust their provisions gradually to recognize potential losses against loans.

Concerning the discretionary behaviors, our results show that poorly capitalized banks use LLP to manage regulatory capital. Provisions of poorly capitalized banks vary directly with their surplus regulatory capital ( $\alpha_8 > 0$ ). When regulatory capital surpluses of poorly capitalized banks are increasing, these banks can increase loan loss provisions<sup>9</sup>. Thus, poorly capitalized banks are less inclined in making LLP. The estimated coefficient of the variable earnings before taxes and loan loss provisions ( $\alpha_6$ ) is significant and negative. This is not consistent with the hypothesis of an income smoothing behavior. On the contrary, banks reduce loan loss provisions when earnings before taxes and loan loss provisions increase. This result strengthens the cyclicality in loan loss provisions already underscored by the non discretionary component since high earnings are recorded during economic upswings. Beside,

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<sup>9</sup>To check for robustness, equation (1) was also ran with the variable total capital ratio (TCR). This variable is not significant. It means that only poorly capitalized banks use LLP to manage regulatory capital. Our other conclusions remain valid. These results are not presented in the paper but are available from the authors upon request.

the variable  $ER\_H_{it}$ , accounting for banks with a relatively good performance, exhibits a positive and significant coefficient ( $\alpha_7$ ). This result suggests a non linearity in the relation between LLP and earnings. Banks with relatively good performances are more able to offset the cyclicity of loan loss provisions. However, wald tests shows that the total impact ( $\alpha_6 + \alpha_7$ ) of earnings on loan loss provisions remains negative and significantly different from zero at the 5% level for banks with a relatively good performance. With regard to the signaling behavior, banks may use discretionary LLP to signal financial strength. We find that the coefficient on  $SIGN_{it}$  ( $\alpha_9$ ) is positive and significant, which is consistent with the signaling hypothesis.

We use the estimates of equation (1) to compute the non discretionary (NDISC) and the discretionary (DISC) components of LLP. It is assumed that these two components are linear functions of the different variables included in equation (1). Thus, they are estimated as the sum of the products of its explanatory variables times the corresponding estimated coefficients from equation (1). To check for robustness, we compute different non discretionary and discretionary variables. The following three non discretionary variables are computed for each of two methods of estimation (Arellano and Bond (1991) and Arellano and Bover (1995)):

$$NDISC1_{it} = \alpha_1 LLP_{it-1} + \alpha_2 NPL_{it} + \alpha_3 \Delta_{t/t+1} NPL_{it} + \alpha_4 L_{it} + \alpha_5 \dot{y}_{it}, \quad (2)$$

$$NDISC2_{it} = \alpha_1 LLP_{it-1} + \alpha_2 NPL_{it} + \alpha_3 \Delta_{t/t+1} NPL_{it} + \alpha_5 \dot{y}_{it}, \quad (3)$$

$$NDISC3_{it} = \alpha_1 LLP_{it-1} + \alpha_2 NPL_{it} + \alpha_3 \Delta_{t/t+1} NPL_{it}. \quad (4)$$

The variable  $NDISC1_{it}$  includes all the variables which may explain the non discretionary

component as well as the the annual growth rate of GDP ( $\dot{y}_{it}$ ) which affects the ability of borrowers to repay banks' assets. The variable  $NDISC2_{it}$  only includes the significant variables at the 10% level, which implies that the variable  $L_{it}$  is excluded compared to  $NDISC1_{it}$ . The third non discretionary variable ( $NDISC3_{it}$ ) excludes  $\dot{y}_{it}$  and the variable  $L_{it}$ . On the same way, two discretionary components are computed:

$$DISC1_{it} = \alpha_6 ER_{it} + \alpha_7 ER\_H_{it} + \alpha_8 TCRL_{it} + \alpha_9 SIGN_{it}, \quad (5)$$

$$DISC2_{it} = \alpha_7 ER\_H_{it} + \alpha_9 SIGN_{it}. \quad (6)$$

We consider the set of explanatory variables that are significant to compute the first discretionary variable,  $DISC1_{it}$ . For the second one, we only keep the variables that may smooth loan loss provisions:  $ER\_H_{it}$  and  $SIGN_{it}$ . Income smoothing and signaling behaviors may offset the evolution of non discretionary provisions, increasing loan loss reserves in good times. These provisions are accumulated when banks record strong earnings and signal their strong earnings power. This occurs when banks are in a good financial situation and could positively affect banks' incentives to supply credits.

These discretionary and non discretionary variables are used to test the impact of provisioning behaviors on bank loans fluctuations.

### 3. Credit fluctuations and provisioning practices

#### 3.1. Specification of credit fluctuations

An empirical model on bank lending fluctuations is used to investigate implications of

bank's provisioning practices. The model we estimate is written as:

$$\begin{aligned} \Delta_{t-1/t}L_{it} = & \beta_0 + \underset{(+)}{\beta_1}\Delta_{t-2/t-1}L_{it-1} + \underset{(+)}{\beta_2}\Delta_{t-1/t}D_{it} + \underset{(+)}{\beta_3}\dot{y}_{it} + \underset{(-)}{\beta_4}i_{it} + \underset{(-)}{\beta_5}\pi_{it} + \underset{(+)}{\beta_6}TCRL_{it} \\ & + \underset{(-)}{\beta_7}NDISC_{it} + \underset{(-)}{\beta_8}NDISC_{it} * Dum + \underset{(+/?)}{\beta_9}DISC_{it} + u_{it}, \end{aligned} \quad (7)$$

where  $\Delta_{t-1/t}L_{it} = (L_{it} - L_{it-1})/0.5(TA_{it} + TA_{it-1})$ ;  $TA_{it}$  is the total asset;  $\Delta_{t-1/t}D_{it}$  is the growth rate of deposits between year  $(t - 1)$  and  $t$ ;  $\dot{y}_{it}$  is the GDP growth rate between the year  $(t - 1)$  and  $t$ ;  $i_{it}$  is the money market rate;  $\pi_{it}$  is the inflation rate;  $TCRL_{it}$  equals  $(\text{total capital ratio} - 8)/8$  when observations for bank  $i$  are in the first quartile of the total capital ratio (TCR) and 0 otherwise;  $NDISC_{it}$  equals to  $NDISC1_{it}$ ,  $NDISC2_{it}$  or  $NDISC3_{it}$ ;  $DISC_{it}$  equals to  $DISC1_{it}$  or  $DISC2_{it}$ ;  $NDISC_{it} * Dum$  equals to the non discretionary variable ( $NDISC1_{it}$ ,  $NDISC2_{it}$  or  $NDISC3_{it}$ ) multiplied by a dummy variable which takes the value of 1 if the bank  $i$  is classified as poorly capitalized and 0 otherwise.

Three groups of variables are considered in the model. Firstly, three macroeconomic variables are introduced. By including inflation and GDP growth rate, the model accounts for the economic environment. We should find a positive sign for the GDP growth rate ( $\beta_3 > 0$ ) since this variable is related to loan demand. The annual inflation rate should have a negative sign ( $\beta_5 < 0$ ). The sign of the coefficient associated with the money market rate should be negative ( $\beta_4 < 0$ ) according to the effect of a contractionary monetary policy on bank lending.

Secondly, we consider bank specific variables. We expect a positive relationship between bank loans fluctuations and the growth rate of deposits between year  $(t - 1)$  and  $t$  ( $\beta_2 > 0$ ). Furthermore, one variable is computed to take into account the effect of regulatory capi-

tal requirements,  $TCRL_{it}$ . We should find a positive sign for the coefficient associated to  $TCRL_{it}$  ( $\beta_6 > 0$ ) since the regulatory capital requirements should represent a constraint for poorly capitalized banks.

Finally, three variables are introduced to analyze the relationship between loan loss provisions and credit supply fluctuations. First, the non discretionary component of LLP ( $NDISC_{it}$ ) takes up reserves that banks have to charge to offset their problem loans. This component of loan loss provisions is therefore expected to reduce bank's incentive to expand its credit supply ( $\beta_7 < 0$ ) as it directly affects profits. During a downturn, the overall return on lending is particularly affected by the upsurge in loan loss provision resulting from backward looking rules. We expect a negative coefficient whatever the non discretionary variable considered:  $NDISC1_{it}$ ,  $NDISC2_{it}$  or  $NDISC3_{it}$ . Second, we introduce an interaction variable  $NDISC_{it} * Dum$  ( $Dum$  is a dummy variable which takes the value of 1 if the bank  $i$  is classified as poorly capitalized) to test if there is non-linearity in the relation between non discretionary provisions and credit fluctuations. Indeed, the effect of non discretionary provisions on credit fluctuations could be stronger for poorly capitalized banks ( $\beta_8 < 0$ ) since these banks cannot use a capital buffer to face an upsurge in loan losses. Third, we consider a discretionary variable:  $DISC1_{it}$  or  $DISC2_{it}$ . The second one takes only into account discretionary behaviors that may have a counterbalancing effect on the cyclical evolution of non discretionary provisions: the income smoothing and the signaling. Such provisions are made when banks are in a good financial situation which could positively affect their ability to supply credits. We therefore expect a positive relationship between the discretionary variable  $DISC2_{it}$  and credit fluctuations in equation (7) ( $\beta_9 > 0$ ). The discretionary variable  $DISC1_{it}$  accounts for different behaviors. As the capital management behavior may have



no clear effect on the cyclicalitity of bank lending and as the variable  $ER_{it}$  does not have the expected sign, the sign of the coefficient associated with the discretionary variable  $DISC1_{it}$  is unknown.

### 3.2. Empirical results

The estimation of equation (7) is performed with the generalized method of moments (GMM). This method is relevant because the provisioning constraints (variables  $NDISC_{it}$  and  $DISC_{it}$ ) are built using the coefficients from the regression of equation (1) and therefore contains measurement error. In addition, the lag of the endogenous variable can lead to a simultaneity bias. These variables are therefore instrumented. Table 2 reports estimates obtained using the GMM estimator proposed by Arellano and Bover (1995)<sup>10</sup>. As we have three different non discretionary variables ( $NDISC1_{it}$ ,  $NDISC2_{it}$  and  $NDISC3_{it}$ ) and two different discretionary variables ( $DISC1_{it}$  and  $DISC2_{it}$ ), Table 2 displays results for six estimations<sup>11</sup>.

As expected, macroeconomic variables are relevant in credit fluctuations in all estimates. The coefficient of the GDP growth rate ( $\beta_3$ ) is significant and positive whereas the coefficient of the inflation rate ( $\beta_5$ ) is negative and significant. The coefficient of the money market interest rate ( $\beta_4$ ) is significant and negative. It means that monetary policy affects bank lending. We also find that banks use deposits to expand credit as the coefficient  $\beta_2$  is positive

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<sup>10</sup>Equation (7) is also estimated with the GMM estimator proposed by Arellano and Bond (1991). These results are similar to the ones obtained with the GMM estimator of Arellano and Bover (1995). They are not presented in the paper but are available from the author upon request.

<sup>11</sup>To check for robustness we also introduce in equation (7) the variation of total assets to take into account structural breaks which may affect the credit supply after a merger/acquisition. This variable, which is strongly correlated with the growth rate of deposits, is positive and significant for the six estimations. Overall, the vast majority of conclusions remain valid. These results are not presented in the paper but are available from the authors upon request.

and significant.

With regard to the institutional constraints, we find that the coefficient associated with the regulatory capital requirements for poorly capitalized banks ( $\beta_6$ ) is positive and significant at the 1% level. These banks are therefore constrained in their lending activities.

The provisioning rules also appear relevant in all estimates. Non discretionary loan loss provisions ( $\beta_7$ ) affect credit fluctuations negatively and significantly at the 1% level (this result is also supported with the Arellano and Bond (1991) estimator). Backward-looking provisioning rules therefore amplify credit cycle: weak specific provisions during upswing phases encourage banks to expand credit whereas the sudden identification of problem loans during downturns constrains banks to make provisions, which reduces their incentive to supply new credits. As expected, poorly capitalized banks appear more constrained by the provisioning system. Indeed, the coefficient associated by the interacting term  $NDISC_{it} * Dum$  is negative and significant. Jordan et al. (2002) emphasize that the cyclicity of loan loss provisions is reflected in bank capital. Indeed, bank capital can also be used to face expected credit losses following a sudden quality deterioration of the loan portfolio. Capital requirements force poorly capitalized banks to shrink further lending when non discretionary provisions increase.

Estimation of the effect of discretionary provisions does not provide conclusive results. Coefficients associated with variable  $DISC1_{it}$  ( $\beta_9$ ) are negative and significant at the 1% level<sup>12</sup>. Strong discretionary provisions could therefore negatively affect bank lending like non discretionary provisions but  $\beta_9$  is significantly weaker in absolute value than ( $\beta_7$ ). Discretionary provisions are therefore less relevant than non discretionary provision to explain

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<sup>12</sup>However, the Arellano and Bond (1991) estimator gives similar result only with specification (7.1).

bank lending behavior. In addition,  $DISC1_{it}$  merges several discretionary behaviors which makes difficult the interpretation of this result. Variable  $DISC2_{it}$  takes only into account provisions made for an income smoothing and/or a signaling purposes. This variable is significant at the 1% level with the expected positive sign in specifications (7.4) and (7.6) but it is not significant at the 10% level in specification (7.5)<sup>13</sup>. Thus we do not find a robust relation between the discretionary variable  $DISC2_{it}$  and credit fluctuations. Moreover, even if the coefficient associated with variable  $DISC2_{it}$  ( $\beta_9$ ) is significant and positive, it is always significantly weaker in absolute value than  $\beta_7$  and then its positive impact on bank lending is limited. As a result, these discretionary provisions are made when banks are in a good financial situation but this provisioning behavior does not seem necessarily relevant to explain bank lending behavior.

#### 4. Credit cycle and dynamic provisioning

A dynamic provisioning system could break or more precisely offset the correlation between non discretionary provisions and credit fluctuations. With a statistical or dynamic provisioning system, general and specific provisions are created continuously in the traditional manner. In addition to these provisions, statistical provisions are created with purpose of anticipating risks arising from changes in business cycles. Statistical provisions are computed as the difference between expected credit losses and specific provisions, i.e. they can either be positive or negative. Spain implemented a dynamic provisioning system in 2000 (Fernandez de Lis et al, 2001). Banks have to estimate precisely their expected credit losses over the business cycle using their own internal models or a standard approach developed

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<sup>13</sup>In addition, the Arellano and Bond (1991) estimator gives similar result only with specification (7.6).

by the regulator. As a result, banks build up statistical provisions during upswing phases – when contemporaneous problem loans and consequently specific provisions are weak compared to total loans – and draw down these “reserves” during downturns. Over the full business cycle, total provisions (specific, general and statistical) are therefore smoothed.

Previous researches (Fernandez de Lis et al, 2001; Borio et al., 2001; Mann and Michael, 2002; Jiménez and Saurina, 2005) emphasize the effect of dynamic provisioning to smooth bank income and to stabilize bank capital. The improvement in the evaluations of both credit risks and bank profits explain these positive outcomes. Furthermore, our findings show that provisioning also influences credit fluctuations. The effect of non discretionary provisions on credit fluctuations result directly from an unsatisfactory backward-looking provisioning system. This factor is not the main source of credit fluctuations, but it could be easily removed. Non discretionary provisions would be smoothed in a dynamic provisioning system (Fernandez de Lis et al , 2001). This system could therefore remove the banks’ incentive to grant new loans when non dicretionnary provisions are decreasing, i.e. when the expected credit risk could be underestimated.

Our research gets to the heart of the differences in opinion between financial supervisors and accounting authorities. Over recent years, different approaches have been proposed to change both national and international accounting standards in order to include more forward-looking practices (Borio et al., 2001). Dynamic provisioning promotes banking stability whereas Full Fair Value Accounting<sup>14</sup> (FFVA) promotes market discipline. Given the cyclicity of bank lending, our results support a dynamic provisioning system as it provides

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<sup>14</sup>Full fair value accounting tries to approximate as closely as possible the value that the asset would have if it were traded on the market. One of the benefits of fair value accounting is that it offers better information to investors.

a more satisfactory institutional arrangement. Conversely, FFVA is not appropriate to support financial stability. It can enhance the procyclical character of bank lending because immediate recognition of unrealized value might reinforce the effects of shocks (Enria, 2004). It also increases banks' earnings and regulatory capital volatilities (Barth et al., 1995) which can impact the volatility of banks' balance sheets. More generally, FFVA does not adequately recognize the specific nature of bank lending. It views banks as portfolio managers rather than as institutions that solve informational problems. For example, Freixas and Tsomocos (2004) show that FFVA affect the liquidity transformation role of banks and could reduce their contribution to inter-temporal smoothing. The banking industry and banking supervisor are therefore opposed to FFVA (Chisnall, 2000).

## 5. Conclusion

The purpose of this research was to determine if the current provisioning system in Europe amplifies credit fluctuations by using a panel of 186 European banks for the period 1992-2004. Our results show that the non discretionary component of LLP amplifies the credit cycle. During an upswing, banks tend to underestimate expected credit risk and then reduce non discretionary LLP. Banks' incentives to grant new loans are therefore reinforced since lending costs are understated. Conversely, sudden identification of problem loans during a downturn constrains banks to make non discretionary provisions, which reduces their incentive to supply new credits. In addition, this effect is stronger for poorly capitalized banks since these banks cannot use a capital buffer to face an upsurge in loan losses. On the contrary, the discretionary component of LLP does not seem relevant to explain credit fluctuations. Our findings are consistent with the call for the implementation of a forward-

looking principle in Europe through a dynamic provisioning system as in Spain. The adoption of a dynamic provisioning system at the European level may imply to harmonize accounting and taxes rules which are very different across countries. The bank regulatory capital which incorporates general provisions up to a ceiling would also need to be changed in order to solely cover unexpected losses.

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## Appendix:

Table A1: Descriptive statistics for European commercial and cooperative banks,  
on average over the period 1992-2004.

	$L$	$\Delta L$	$D$	$E$	$NPL$	$LLP$	$TCR$	$ROA$
Mean	58.53	6.51	65.67	7.22	5.08	0.41	12.43	0.61
Max	97.89	48.02	92.32	75.84	29.02	3.76	39.32	3.09
Min	11.63	-25.77	12.10	1.55	0.00	-0.35	6.01	-6.09
Std	16.25	7.75	14.56	4.43	4.37	0.36	4.26	0.54

**Variable definitions:** All variables are in percentage.  $L$ : loans/total assets;  $\Delta L$ : loans' variation of bank  $i$  between years  $(t-1)$  and  $t$  /  $0.5 \cdot (\text{total assets of year } (t-1) + \text{total assets of year } t)$ ;  $D$ : deposits/total assets;  $E$ : equity/total assets;  $NPL$ : non-performing loans/gross loans;  $LLP$ : loan loss provisions/total assets;  $TCR$ : total capital ratio;  $ROA$ : return on asset.

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Table 1: Non discretionary and discretionary components of LLP(equation (1))

	(1.1) (Arellano-Bond)	(1.2) (Arellano-Bover)
$LLP_{it}(-1)$ (+)	0.2624 <sup>a</sup> (0.0357)	0.2723 <sup>a</sup> (0.0336)
$NPL_{it}$ (+)	0.0261 <sup>a</sup> (0.0098)	0.0248 <sup>a</sup> (0.0084)
$\Delta_{t/t+1}NPL_{it}$ (+)	0.0009 <sup>b</sup> (0.0004)	0.0011 <sup>a</sup> (0.0004)
$L_{it}$ (+)	0.0029 (0.0022)	0.0026 (0.0019)
$\dot{y}_{it}$ (-)	-0.0113 <sup>a</sup> (-0.0044)	-0.0120 <sup>a</sup> (-0.0041)
$ER_{it}$ (+)	-0.3522 <sup>a</sup> (-0.0298)	-0.3541 <sup>a</sup> (-0.0278)
$ER\_H_{it}$ (+)	0.2271 <sup>a</sup> (0.0306)	0.2204 <sup>a</sup> (0.0292)
$TCRL_{it}$ (+)	0.4148 <sup>a</sup> (0.1476)	0.4190 <sup>a</sup> (0.1420)
$SIGN_{it}$ (+)	0.0299 <sup>c</sup> (0.0163)	0.0335 <sup>b</sup> (0.0148)
J-stat	45.16	43.23
(p-value)	(0.51)	(0.58)
Obs.	739	739

**Note:** a, b and c indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are corrected for heteroskedasticity following White's methodology.

Table 2: Bank loan fluctuations (Arellano Bover (1995) estimator)

	(7.1)	(7.2)	(7.3)	(7.4)	(7.5)	(7.6)
$\Delta_{t-1/t}L_{it}(-1)$ (+)	0.0268 <sup>a</sup> (0.0031)	0.0159 <sup>a</sup> (0.0016)	0.0124 <sup>a</sup> (0.0018)	0.0440 <sup>a</sup> (0.0020)	0.0430 <sup>a</sup> (0.0043)	0.0241 <sup>a</sup> (0.0023)
$\Delta_{t-1/t}D_{it}$ (+)	0.2270 <sup>a</sup> (0.0031)	0.2363 <sup>a</sup> (0.0017)	0.2389 <sup>a</sup> (0.0018)	0.2517 <sup>a</sup> (0.0045)	0.2716 <sup>a</sup> (0.0020)	0.2611 <sup>a</sup> (0.0022)
$\dot{y}_{it}$ (+)	0.9673 <sup>a</sup> (0.0344)	0.9644 <sup>a</sup> (0.0162)	1.099 <sup>a</sup> (0.0220)	0.8865 <sup>a</sup> (0.0176)	0.9329 <sup>a</sup> (0.0326)	1.0406 <sup>a</sup> (0.0119)
$\dot{i}_{it}$ (-)	-0.5383 <sup>a</sup> (-0.0257)	-0.5050 <sup>a</sup> (-0.0161)	-0.4860 <sup>a</sup> (-0.0132)	-0.4955 <sup>a</sup> (-0.0179)	-0.5414 <sup>a</sup> (-0.0778)	-0.4172 <sup>a</sup> (-0.0121)
$\pi_{it}$ (-)	-0.3903 <sup>a</sup> (-0.034)	-0.4525 <sup>a</sup> (-0.0182)	-0.3814 <sup>a</sup> (-0.0243)	-0.3830 <sup>a</sup> (-0.0288)	-0.6597 <sup>a</sup> (-0.0429)	-0.2993 <sup>a</sup> (-0.0161)
$TCRL_{it}$ (+)	0.1985 <sup>a</sup> (0.0068)	0.1874 <sup>a</sup> (0.0033)	0.2035 <sup>a</sup> (0.0036)	0.2040 <sup>a</sup> (0.0126)	0.2399 <sup>a</sup> (0.0121)	0.2264 <sup>a</sup> (0.0056)
$NDISC1_{it}$ (-)	-0.0488 <sup>a</sup> (-0.0059)	-	-	-0.0526 <sup>a</sup> (-0.0034)	-	-
$NDISC2_{it}$ (-)	-	-0.0683 <sup>a</sup> (-0.0026)	-	-	-0.0581 <sup>a</sup> (-0.0057)	-
$NDISC3_{it}$ (-)	-	-	-0.0789 <sup>a</sup> (-0.0031)	-	-	-0.0872 <sup>a</sup> (-0.0011)
$NDISC_{it}*Dum$ (-)	-0.0250 <sup>a</sup> (-0.0031)	-0.0520 <sup>a</sup> (-0.0019)	-0.0450 <sup>a</sup> (-0.0020)	-0.0154 <sup>a</sup> (-0.0059)	-0.0619 <sup>a</sup> (-0.0115)	-0.0410 <sup>a</sup> (-0.0049)
$DISC1_{it}$ (?)	-0.0104 <sup>a</sup> (-0.2123)	-0.0056 <sup>a</sup> (-0.0013)	-0.0075 <sup>a</sup> (-0.0011)	-	-	-
$DISC2_{it}$ (+)	-	-	-	0.0189 <sup>a</sup> (0.0029)	0.0088 (0.0108)	0.0236 <sup>a</sup> (0.0022)
J-stat	98.02	98.50	99.69	98.94	93.56	104.24
(p-value)	(0.45)	(0.44)	(0.40)	(0.43)	(0.58)	(0.29)
Obs.	556	556	556	556	556	556

**Note:** a, b and c indicate significance respectively at the 1%, 5% and 10% levels. Standard errors are corrected for heteroskedasticity following White's methodology.